State of Alaska
Department of Fish and Game
Nomination for Waters
Important to Anadromous Fish

AWC Volume (SE) SC SW W AR IN USGS Quad MT. FAIRWEATHER D-1 SKAGWAY A-3

Anadromous Water Catalog Number of Waterway 114-77-10350 & 114-77-10350-2008

Name of Waterway Nunatak Creek USGS name ___ Local name ✓

Addition ✓ Deletion ___ Correction ___ Backup Information ___

For Office Use

Nomination # 95 280

Revision Year: ___

Revision to: Atlas ___ Catalog ___ Both X

Revision Code: A-2

Regional Supervisor — Date 12-30-94

Ed Weiss — 1/5/95

Drafted — Date 1/17/95

OBSERVATION INFORMATION

Species	Date(s) Observed	Spawning	Rearing	Migration	Anadromous
PINK	SEE ATTACHED				
CHUM	"				
COHO	"				
SOCKEYE	"				

Please see attachments.

IMPORTANT: Provide all supporting documentation that this water body is important for the spawning, rearing or migration of anadromous fish, including: number of fish and life stages observed; sampling methods, sampling duration and area sampled; copies of field notes; etc. Attach a copy of a map showing location of mouth and observed upper extent of each species, as well as any other information such as: specific stream reaches observed as spawning or rearing habitat; locations, types, and heights of any barriers; etc.

Comments: ___

RECEIVED
JAN 04 1995
STATE OF ALASKA
FISH & GAME
HABITAT & RESTORATION

Name of Observer (please print) Chad Soiseth

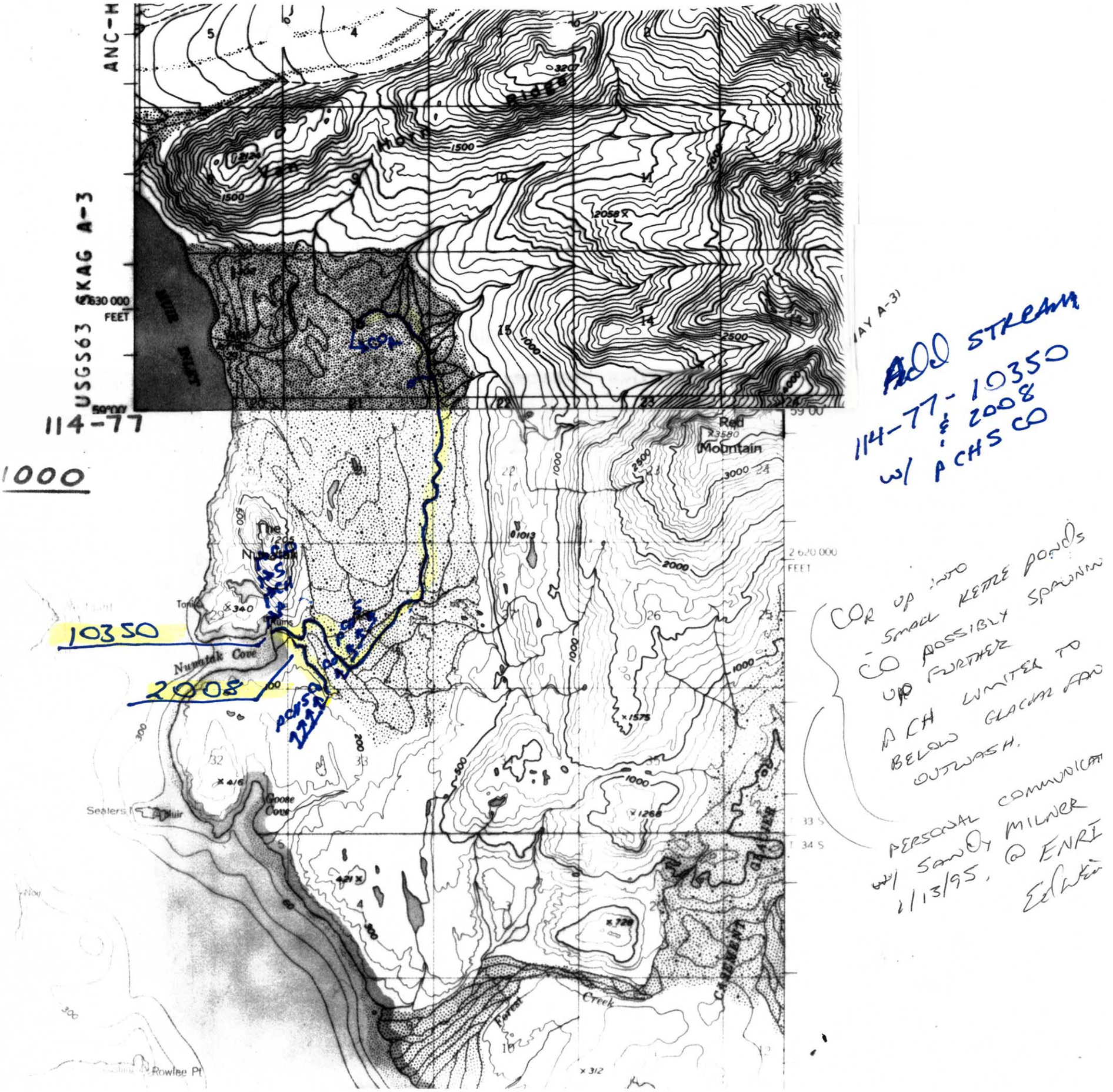
Date: 14 Dec. 1994 Signature: Chad Soiseth

Address: NATIONAL PARK SERVICE
GLACIER BAY NATIONAL PARK
& PRESERVE
P. O. BOX 140
GUSTAVUS, AK 99826-0140

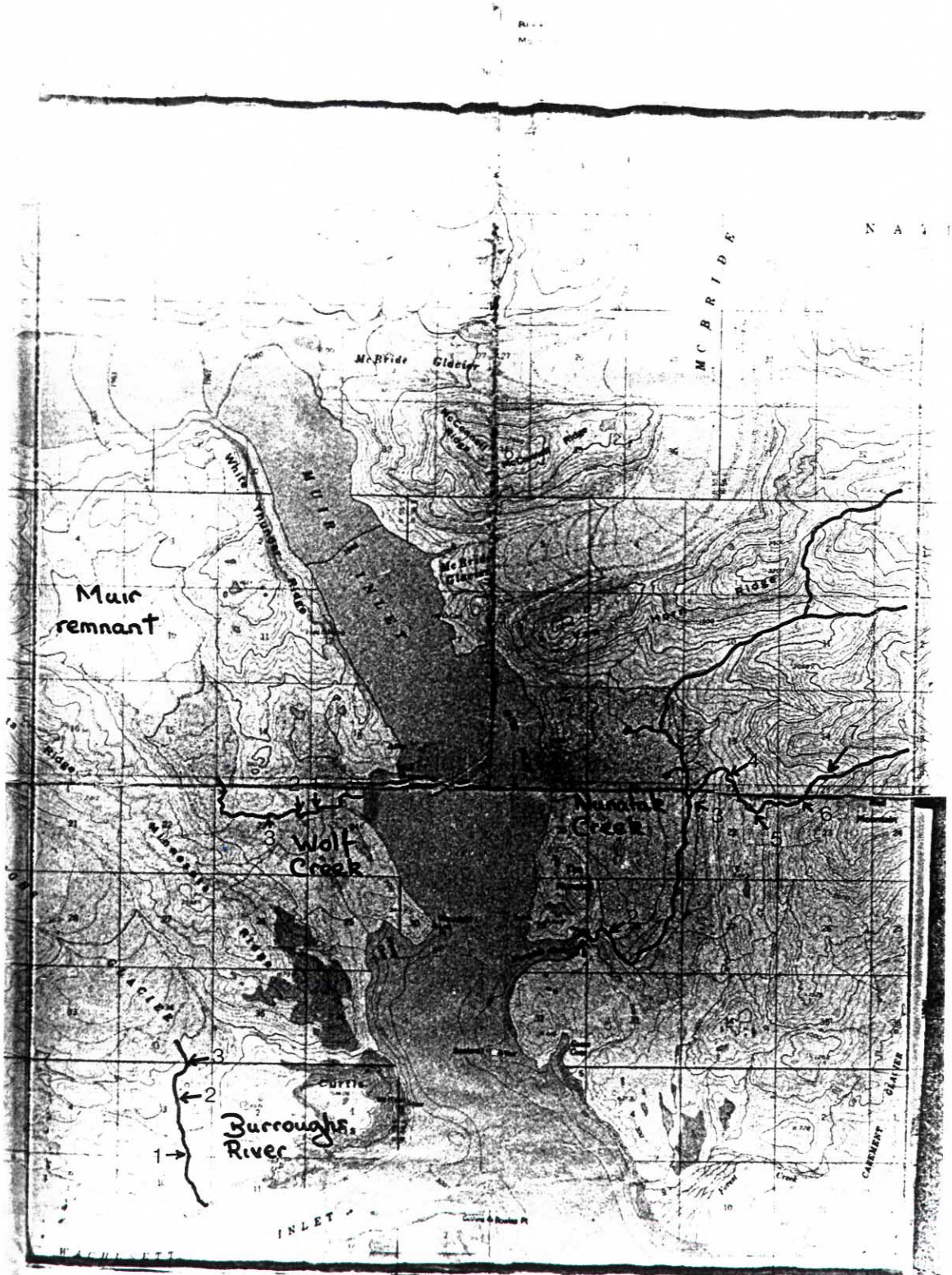
This certifies that in my best professional judgement and belief the above information is evidence that this waterbody should be included in or deleted from the Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes per AS 16.05.870.

Signature of Area Biologist: Mike Bethe 12/30/94

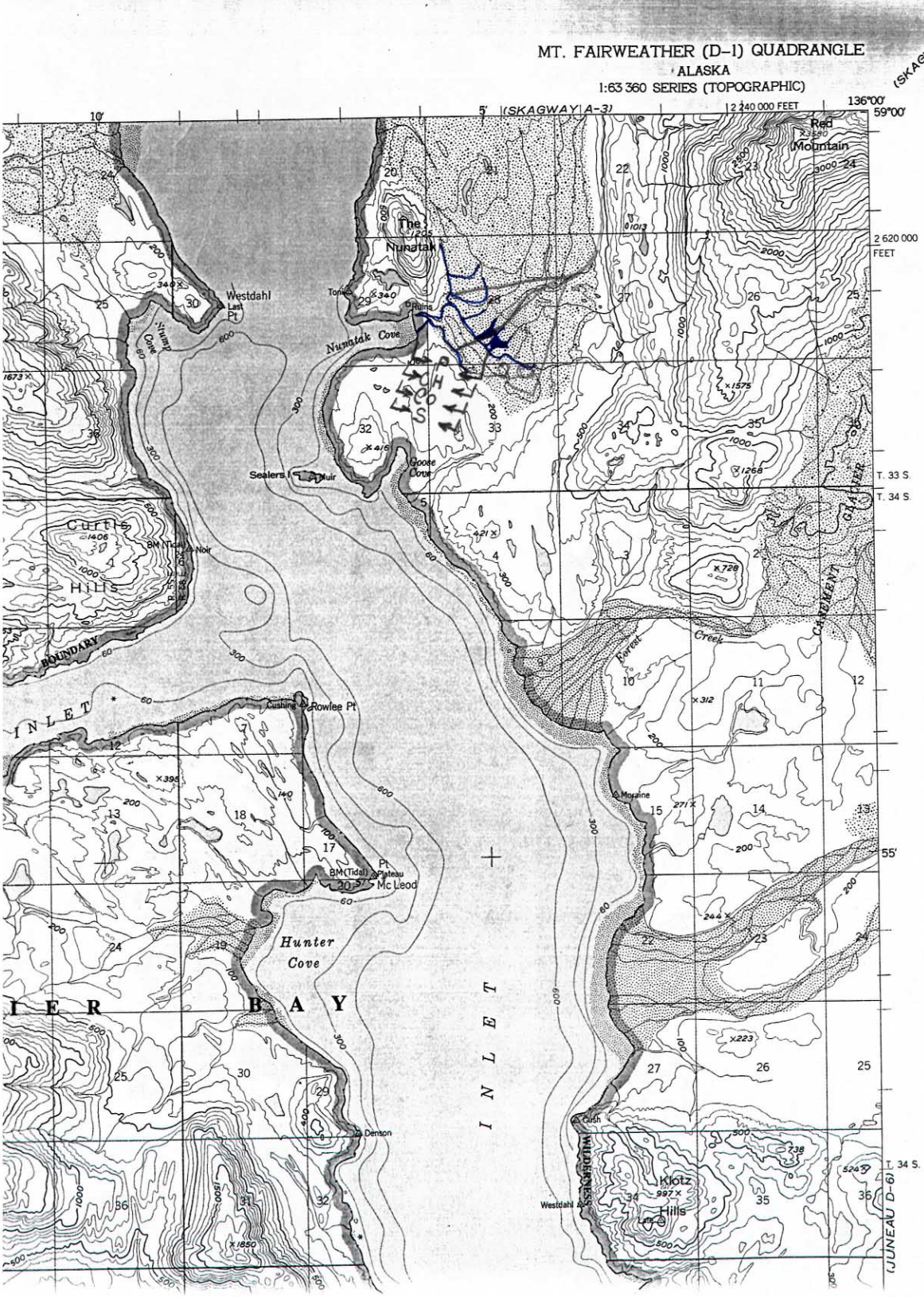
Rev. 7/93


ANC-H
USGS63 SKAG A-3
114-77
1000
Red Mountain
Numatak Cove
Goose Cove
Sealers Pt
Rowlee Pt
Forrest Creek
10350
2008
Add STREAM
114-77-10350
& 2008
w/ PCHS
OR up into small kettle ponds
CO possibly spawning up further
ACH winter to below glacial outwash.
personal communication w/ Sandy Milner 1/13/95, @ ENRI Eklutna

FROM MILLER M.S. THESIS



1·5 cm = 1 km



NPS# 303
ADFGHAB # 114-77

Nunatak Creek

Adfglabno	Npsno	Strmkm	Date	Species	Li	No_live	No_dead	Source
114-77	303.0		07/30/89			0	0	Blackie 1989
114-77	303.0		08/15/77	GAAC	A	0	0	Milner 1978
114-77	303.0		/ /	ONGO	S	0	0	Prather and
114-77	303.0		08/26/75	ONGO	S	15	1	Unknown 1975
114-77	303.0		09/15/85	ONGO	S	828	0	Milner 1989
114-77	303.0		09/23/89	ONGO	S	0	7	Blackie 1989
114-77	303.0		08/17/91	ONGO	S	456	45	Milner 1994
114-77	303.0		08/30/91	ONGO	S	302	45	Milner 1994
114-77	303.0		09/03/91	ONGO	S	1000	1400	Kondzela 1991
114-77	303.0		08/10/92	ONGO	S	2	0	Milner 1994
114-77	303.0		08/24/92	ONGO	S	11	2	Kondzela 1992
114-77	303.0		08/26/92	ONGO	S	12	1	Milner 1994
114-77	303.0		09/14/92	ONGO	S	50	75	Milner 1994
114-77	303.0		07/31/93	ONGO	S	2038	0	Milner 1994
114-77	303.0		08/06/93	ONGO	S	1925	0	Milner 1994
114-77	303.0		08/14/93	ONGO	S	1888	162	Milner 1994
114-77	303.0		08/19/93	ONGO	S	1736	0	Milner 1994
114-77	303.0		08/31/93	ONGO PS	S	1500	0	Kondzela 1993
114-77	303.0		08/29/94	ONGO	S	956	1540	Milner 1994
114-77	303.0		08/30/94	ONGO	S	24	0	Kondzela 1994
114-77	303.0		08/31/94	ONGO	S	1750	0	Kondzela 1994
114-77	303.0		09/03/94	ONGO	S	405	1876	Milner 1994
114-77	303.0		/ /	ONKE	S	0	0	Prather and
114-77	303.0		09/15/85	ONKE	S	129	0	Milner 1989
114-77	303.0		09/23/89	ONKE	S	0	6	Blackie 1989
114-77	303.0		09/03/91	ONKE	S	55	20	Kondzela 1991
114-77	303.0		08/24/92	ONKE CJ	S	2	0	Kondzela 1992
114-77	303.0		09/14/92	ONKE	S	150	0	Milner 1994
114-77	303.0		08/19/93	ONKE	S	3	0	Milner 1994
114-77	303.0		08/31/93	ONKE	S	20	0	Kondzela 1993
114-77	303.0		08/29/94	ONKE	S	31	0	Milner 1994
114-77	303.0		08/30/94	ONKE	S	4	0	Kondzela 1994
114-77	303.0		08/31/94	ONKE	S	20	0	Kondzela 1994
114-77	303.0		09/01/94	ONKE	S	750	0	Kondzela 1994
114-77	303.0		09/03/94	ONKE	S	8	8	Milner 1994
114-77	303.0		08/10/77	ONKI	F	31	0	Milner 1983c
114-77	303.0		08/10/77	ONKI SS	J	44	0	Milner 1983c
114-77	303.0		08/15/77	ONKI	S	0	0	Milner 1978
114-77	303.0		08/15/77	ONKI	J	0	0	Milner 1983c
114-77	303.0		08/15/78	ONKI	S	8	0	Milner 1989
114-77	303.0		11/15/78	ONKI	S	8	0	Milner 1983c
114-77	303.0		08/15/79	ONKI	J	0	0	Milner 1983c
114-77	303.0		08/15/85	ONKI	S	3	0	Milner 1989

Adfghabno	Npsno	Strmkm	Date	Species	Li	No_live	No_dead	Source
114-77	303.0		08/26/75	ONNE	S	16	0	Unknown 1975
114-77	303.0		08/15/77	ONNE	S	85	0	Milner 1978
114-77	303.0		08/15/77	ONNE	J	0	0	Milner 1983c
114-77	303.0		08/15/79	ONNE	J	0	0	Milner 1983c
114-77	303.0		08/15/80	ONNE	S	12	0	Milner 1983c
114-77	303.0		09/15/80	ONNE	S	12	0	Milner 1989
114-77	303.0		09/03/91	ONNE	S	0	2	Kondzela 1991
114-77	303.0		08/06/93	ONNE	S	9	0	Milner 1994
114-77	303.0		08/19/93	ONNE	S	19	0	Milner 1994
114-77	303.0		08/31/93	ONNE	S	6	0	Kondzela 1993
114-77	303.0		08/29/94	ONNE	S	0	0	Milner 1994
114-77	303.0		09/01/94	ONNE	S	200	1	Kondzela 1994
114-77	303.0		09/03/94	ONNE	S	0	2	Milner 1994
114-77	303.0		/ /	SAMA	S	0	0	Prather and
114-77	303.0		07/17/65	SAMA	A	1	0	Merrel 1965
114-77	303.0	0-0.2	07/12/69	SAMA	A	1	0	Cornelius and
114-77	303.0		08/15/77	SAMA	A	0	0	Milner 1978
114-77	303.0		08/15/77	SAMA	J	0	0	Milner 1983c
114-77	303.0		08/15/77	SAMA	F	37	0	Milner 1983c
114-77	303.0		08/15/77	SAMA	J	36	0	Milner 1983c
114-77	303.0		08/15/79	SAMA	J	0	0	Milner 1983c
114-77	303.0		07/30/89	SAMA	A	0	0	Blackie 1989
114-77	303.0		07/30/89	SAMA	J	0	0	Blackie 1989
114-77	303.0		09/23/89	SAMA	J	0	0	Blackie 1989
114-77	303.0		08/28/69	TRSP	A	6	0	Cornelius and

United States Department of the Interior

NATIONAL PARK SERVICE
Glacier Bay National Park and Preserve
P.O. Box 140
Gustavus, Alaska 99826-0140

IN REPLY REFER TO:

14 December 1994

Roger Harding
Alaska Department of Fish and Game
Division of Sport Fish
P.O. Box 240020
Douglas, AK 99824

Dear Mr. Harding,

Enclosed please find information on 9 streams within Glacier Bay National Park and Preserve (GBNPP). We wish to submit this information for your review and propose these streams be included in the Anadromous Waters Catalog (AWC) and associated Atlas.

Over the past 2 years we have conducted an exhaustive search of all pertinent information relating to the distribution and abundance of salmonids and other anadromous and freshwater species in streams throughout GBNPP. Additionally we have developed a comprehensive database of this information. Currently we are nearing final analysis and write-up. The information submitted for the 9 streams currently proposed (8 additions and 1 correction) for anadromous waters designation was extracted from this database. A draft data dictionary documenting and defining field attributes is enclosed to assist in evaluation of the summary queries for each stream system. In addition, we have enclosed photocopies of portions of documents from which this information was obtained. Many of the photocopied documents are portions of larger documents (*i.e.* field notebooks, unpublished surveys, final reports, journal articles *etc.*). We have also enclosed a draft bibliography to provide additional documentation of the original information sources. Photocopies of the original sources in entirety would be superfluous.

Streams are generally referenced using the unique National Park Service (NPS) number and also ADF&G Habitat and Reclamation as well as Commercial Fisheries Division numbers. However, photocopies of the original source documents dated between 1963 and 1966 generally refer to specific streams using an outdated NPS numbering system. These numbers are indicated and may be referenced from map sections associated with the USNPS (1963) document.

We hope the information submitted in this packet will be sufficient for inclusion of these streams in the AWC and Atlas. One of my staff, Chad Soiseth, spoke with Ed Weiss, at the Habitat and Reclamation Division in Anchorage and requested that this information be included in the 1995 revision to the Catalog and Atlas. Ed agreed that this information could be included in the 1995 Catalog and Atlas provided he received it in the Anchorage office by December 20. Ed also pointed out that following your review the nomination forms would require Regional Habitat Biologist Lana Shea's approval. We greatly appreciate your effort in expediting the nomination and approval process. Should you have any questions or require additional information please contact Chad Soiseth or the Chief of Resource Management, Mary Beth Moss. Thank you for your time and attention on this matter.

Sincerely,

Marvin O. Jensen
Superintendent

Field attributes and data dictionary for an inventory data base: Biological characteristics of stream systems and salmonid distribution and abundance (stream_s.dbf)

DRAFT

(Sept. 1994 version)

Attributes or field names used in the data base are listed below.

adfgcfno (10 chars.)-this Alaska Department of Fish and Game (ADF&G) Commercial Fisheries Division number often corresponds with the ADF&G Habitat Division number (***adfghabno***) below. However, this number is always abbreviated relative to the ***adfghabno***. The first five digits are generally identical to the adfghabno but are followed by a 3 digit number which is a derivation of the 5 digit adfghabno (see below). The suffix of this 3 digit number lacks the stream order identifier and the final digit is omitted. Thus the ***adfgcfno*** for the Bartlett River is 114-70-090. Occasionally, ***adfgcfnos*** differ markedly from ***adfghabnos***.

adfghabno (27 chars.)-this designation is the ADF&G Habitat and Reclamation Division 's numbering system. Some streams, rivers and lakes have a unique identifying number as listed in the Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes (AWC) and associated Atlas. The number begins with a body of saltwater identified by the ADF&G statistical fishing district number in 1982. Each district has a 5 digit number (a 3 digit number and a 2 digit number separated by a hyphen). The first order streams (flowing directly into saltwater and lacking tributaries; this ordering method is easily confused with the universally accepted Strahler (1959) method which orders streams from the headwaters downstream; see stream order definition in the *Field Attributes and Data Dictionary* for physchars.dbf) are identified by a 5 digit number added to the fish district number into which it flows. This second group of five digits is started by the number 1 which signifies a first order or primary stream. For example, the Bartlett River is 114-70-10900 (114-70 identifies the statistical fishing district and 10900 is the first order stream within that district). A second order stream branching from a first order stream is identified using the same base number (114-70-10900) plus a four digit number indicating that specific tributary. In the example for the Bartlett River this number is 2009. Thus the stream number for this second order stream would be 114-70-10900-2009. Third, fourth and higher order streams are numbered in the same way by adding a four digit number for each branch. The first digit for each branch sequence always indicates the stream order. The last digit in the number sequence used to identify second and higher order streams is even numbered if the tributary branches to the right (facing upstream) and odd numbered if it branches to the left. Lakes are designated by a number sequence with a first digit of 0. In the Bartlett River example, a lake occurs along a first order stream. Thus the lake number incorporates the first order stream number (114-70-10900) plus the four digit lake identifier (0010) to give the lake's number as 114-70-10900-0010.

npsno (5 numeric)-each stream has been assigned a unique identifying number which can be referenced from a master set of 1:63,360 scale topographic maps. Assignment of reference numbers to individual streams is part of a redundant system of referencing entries since streams can also be referenced by ADF&G # (both Comm. Fish and Habitat Division), mouth location (UTM's or lat. long.), or stream name.

strmkm (5 characters)-is the extent of survey efforts from the lower section of a survey reach to the upper section surveyed. Distance is measured from the upper limit of the rye grass at the mouth toward the head of a stream.

date (mm/dd/yy)-is the date that the particular survey or research was conducted.

spp (4 characters)-are the species observed in a stream system according to accounts from published and unpublished literature sources. Species designations are by the first two letters of the scientific name (each of genus and species). (see Morrow, J.E. 1980. The freshwater fishes of Alaska. Alaska Northwest Publishing Company, Anchorage, AK. 248 pp.)

Common name	Scientific name	Species designation
King or Chinook	*Oncorhynchus tschawytscha*	ONTS
Sockeye or Red	*Oncorhynchus nerka*	ONNE
Pink or Humpy	*Oncorhynchus gorbuscha*	ONGO
Chum or Dogs	*Oncorhynchus keta*	ONKE
Coho or Silver	*Oncorhynchus kisutch*	ONKI
Dolly Varden	*Salvelinus malma*	SAMA
Cutthroat	*Oncorhynchus clarki*	ONCL
Steelhead, rainbow trout	*Oncorhynchus mykiss*	ONMY
Threespine stickleback	*Gasterosteus aculeatus*	GAAC
Aleutian or Coast range sculpin	*Cottus alleuticus*	COAL
Slimy sculpin	*Cottus cognatus*	COCO
Unidentified Cottid spp.		COSP
Pacific staghorn sculpin	*Leptocottus armatus*	LEAR
Eulachon	*Thaleichthys pacificus*	THPA
Pacific lamprey	*Lampetra tridentatus*	LATR
Starry flounder	*Platichthys stellatus*	PLST
Unknown Pacific salmon spp.		SASP
Unknown trout spp.		TRSP
Unknown spp.		UNSP

lifestg (1 character)-is the stage of development observed and reported for each species. A single stage of development or all life stages may have been observed for each species in any stream system. Life stages and definitions are based on Milner (1989) and for salmonids generally include: 1.) fry (F)-small fish or young-of-the-year fish (YOY) generally $\leq$ 30-70 mm total length depending on time of year (*i.e.* May-Oct.), 2.) juveniles (J)-fish in their second summer of life (age 1+ yrs.) and generally > 70 mm, 3.) adults (A)-sexually mature fish, and 4.) spawning adults (S)-adult fish observed to be in breeding or spawning coloration.

no_liv (6 numeric)-is the number of live individuals of each species / life stage observed during a particular visit.

no_dead (6 numeric)-similar to above is the number of dead individuals of each species / life stage observed during a particular visit. Typically this refers to adult Pacific salmon post spawning.

source (40 characters)-is the source (published or unpublished) from which the information was taken. Enter the last name of the primary author (first letter capitalized) followed by the date (yr.) of publication, date the unpublished report was prepared, or the date the survey was conducted.

mthd (1 character)-is the general method used to conduct the survey. Methods include A=fixed wing aircraft, H=helicopter, F=foot, B=boat, S=seine, R=angling, E=electrofishing, D=dip netting, M=minnow trapping, T=trapping (including fyke and hoop traps), G=gill netting, and U=unknown methods.

reliab (1 numeric)-is a measure of the reliability of the data based on what is known about survey methods and procedures for each survey team or surveyor where:

3= highly certain (Considerable sampling data is available and distribution ecology and preferred habitats are generally well documented within a watershed).
2= moderately certain (Some sampling data is available and distribution, preferred habitats, and ecology are documented in similar watersheds).
1= reasonable inference (Little or no sampling data available. Information on species distributions, ecology and preferred habitats documented in similar watersheds. Information may be second hand information or through personal conversation).

Examples: Aerial surveys assume that certain species are present in a stream during counts depending on time of year and thus species is generally inferred with no sampling data to substantiate species determinations (reliab=1). Foot surveys generally allow much more positive identification of species and this is further substantiated when capture information provides "hands-on" evidence of earlier developmental stages (reliab=2). Few workers in GBNP&P, (ADF&G, Milner, and Murrell), exhibit highly certain reliability (reliab=3).

Submitting Stream Survey Information to ADF&G Habitat Division for Anadromous Stream Nomination

December 1994

Background:

The following streams were selected from the biological (stream_s. dbf) database based on the criteria of required documentation of the occurrence of at least two species of anadromous salmonids. We evaluated the amount of information for each stream system and selected eight streams for addition and one stream (Vivid Creek) for correction. The ADF&G Anadromous Waters Catalog (AWC) and Atlas currently list the south outlet rather than the northwest outlet of Vivid Lake. See information below.

Prior to submission:

*We compiled information from ring binders, maps and queried the database for information on each stream and hardcopies (complete file) of all available information were organized by stream into file folders. These files are to be submitted to ADF&G.
*Database summaries (queries) were checked against source documents.
*The known upper and lower boundaries of distribution for each species were indicated on maps of each stream. This is reportedly a fairly strict requirement according to Ed Weiss, ADF&G Habitat and Restoration Biologist overseeing the AWC and Atlas.
*The location, type, and height of any know barrier or obstruction was noted.
*The draft bibliography indicating source documents for proposed Catalog and Atlas streams will be provided to ADF&G. We will also provide a draft of the data dictionary describing the fields in the database to aid in interpretation of the queries.
*The effect of designation on research and stream monitoring was investigated with both the state and Regional Office. We also looked into the possibility of submission being misconstrued by ADF&G as an admission by the NPS that the state has jurisdiction over Park waters (see letter from Ross Kananaugh, ARO).

Stream listing:

The streams for consideration are listed below by ADF&G Habitat and Restoration Division statistical unit number (ADF&GHAB#), National Park Service number (NPS#), and stream name if applicable. The status of our evaluation was listed along with a brief summary of the available information.

Ed - Would this qualify for mouth of stream?

ADF&GHAB#	NPS#	Stream Name	Status
114-60	165	Unnamed	Not submitted to ADF&G

Three sources of information exist for this stream. However, only a single survey conducted by Selig in August of 1982 provides evidence of spawning anadromous salmonids. On 28 August 323 chum and 22 pink salmon were observed spawning in this system. According to Selig "the spawning was confined to the intertidal area and slightly above, as the water volume decreased as the stream entered the woods, forking into even smaller branches". Because spawning appears to be confined to the intertidal zone and rearing or spawning salmonids were not documented to occur higher up in the watershed it seems unlikely that this stream would meet the requirements.

114-60	161	Dog Hole Zay Head	Submitted

Two records of 50 and 5 pink salmon in 1963 and 1982, respectively, exist for this system. Four records of 10-400 chum salmon from 1960-1982 exist. One record in 1964 of 125 salmon (no species indicated) exists. Records indicating location along stream reach indicate that salmon were observed "just above the intertidal zone".

114-60-10200 166.5 Unnamed Not Submitted

Inadequate information.

Ed - would this qualify for mouth of stream up to 1st barrier?

114-70 300 Wolf Creek Not submitted.

Two records of 48 and 350 chum salmon in 1969 and 1984, respectively, exist for this stream. One record of a single coho salmon fry was also reported on 1 Sept. 1984. A series of falls or cascades 7-10 ft. in height and approximately 300-450 yards above tidal influence presents a potential barrier to anadromous fish passage upstream. Reports of chum salmon were all below the barrier.

114-70 369.0 York Creek Not Submitted

Inadequate information.

114-71 203 SW Berg Bay Not submitted.

Three hundred pink salmon were reported in August of 1959 by Mattson et al. (1959) with no location given. Huneke and Owens reported 30-40 chum salmon in August of 1966 but reported no location.

?

114-73 227 Oystercatcher Creek *Undecided*

The 1975 Up-Bay ranger (Unknown 1975) reported 300-400 pink salmon in the first 1/4 mile of this system on 21 August 1975. Chris Kondzela (19901) reported < 100 pink salmon present in the mouth and intertidal section of this stream on 22 August 1990. Based on information by Woll (1970), this stream may support an anadromous run of Dolly Varden.

114-73 216 Wood Creek Submitted

Chum salmon were first reported in 1961 with sporadic and poorly quantified reports in 1962 and 1969. A dozen pink and chum salmon were reported by Cornelius and Haeker (1969) in the lower tidal influenced portion of this system in early September 1969. Kondzela (1990) reported 32 pink and 28 chum salmon in the intertidal area of this stream on 5 September 1990.. A 20 ft. falls ca. 300 yards upstream (just below outlet of lower pond) may possibly restrict or limit fish passage to Wood Lake.

114-75 101 NW Vivid Lake Stream Submitted as correction.

The southern outlet has been designated in the Catalog and Atlas. However, this tributary channel is narrow, steep and extremely shallow and no observations of anadromous species exist. Almost all observations of salmonids in the Vivid Lake system have been restricted to the northwest outlet. Seventy-one juvenile cutthroat trout and one adult were reported by Selig and Heacox (1984). Seventeen records of adult pink salmon (ranging from 2-7,000 spawners) from 1970-1994 exist. Twenty records ranging from 22-2,200 adult chum salmon exist for the years 1976-1994. Seven records of up to 40 fry, juvenile or adult coho salmon exist from 1977-1990. Twenty-one records of juvenile and adult sockeye salmon for 1970-1994 exist in the database. Lake access is currently restricted during low discharge-base flow periods due to the phenomenon of isostatic rebound (Kondzela 1993, 1994, Milner pers. comm.). Milner (1992) indicates that the lake is accessible only during periods of high discharge. Dr. Milner further suggests that the sockeye run will not be sustained when lake access is finally severed, however, spawning currently may occur in the stream and fry may migrate into the lake during periods of increased flow. Kondzela and Milner were contacted regarding accessibility and extent of anadromous species distribution in the stream. A barrier (waterfall or series of cascades) ca. 0.8 km upstream of lake prohibits fish passage further upstream (Blackie 1989).

114-77 303 Nunatak Creek Submitted

Nineteen records of pink salmon between 1975 and 1994 ranging from tens to thousands of spawners have been reported. Twelve records of 2-750 chum salmon exist for 1985-1994. Eight records of fry, juvenile and spawning adult coho salmon (in low numbers) between 1977 and 1985 are evident. Thirteen records of juvenile and adult sockeye exist between 1975 and 1994. Numbers of live spawning adult sockeye range from 6-200. Apparently salmon occur in a side channel as well as in the main channel upstream above the lake(s) and in the inlet channel to the lower lake (ca. 0-1.5 km above the upper extent of the intertidal zone. According to Milner and Kondzela (pers. comm.) pink and chum salmon occur up to the lower lake and sockeye have been documented to occur in both lakes and in the inlet to the lower lake.

114-77 331.0 Unnamed Not Submitted

Inadequate information.

114-77 336 Wolf Point Creek Submitted

Fourteen records of pink salmon between 1989 and 1994 ranging from 3 to more than 2,500 spawners are evident. Ten records of chum salmon (ranging from 1 to 44 live spawners) exist for the period 1989-1994. Seven records of 2-19 adult sockeye exist for 1993 and 1994. A barrier (waterfalls) below proglacial Lake Lawrence (Muir Glacier Remnant) prohibits salmonid access to the lake (Blackie 1989, Milner 1992, Kondzela 1994). Two sections of falls ca. 20-30 ft. in height occur in the reach ca. 20 m directly below the outlet to Lawrence Lake (Milner, pers. comm.). All salmonid species are distributed up to the base of the first falls.

114-77 308 Gull Creek Submitted.

Thirteen records of 5 to more than 1,200 adult pink salmon from 1989 to 1994 exist. Fifteen records of 5 to 400 adult sockeye spawners exist for 1991-1993. According to Milner (pers. comms.), the inlet streams to Gull Lake have been dry during the last two summers (1993, 1994). Both species occur up to and in the lake during the spawning period. Pinks have been reported to aggregate along the east side and sockeye along the west shore (Kondzela, pers. comm.). Salmonid distribution in the mainstem above the lake is currently unknown.

116-11 2 Unnamed Submitted

Twelve to sixteen hundred adult pink salmon were reported within this system on 10 and 21 August, 1983, respectively. Adult pink salmon were observed from the mouth to ca. 800 yards upstream. Seventeen YOY and two 1+ age cohos were caught among 5 minnow traps fished for 1 hour on 21 Aug. 1983 approximately 700 yards upstream of the mouth.

116-11 4 Unnamed Not Submitted

Inadequate information.

116-11 6 Dixon River Submitted

Eight records of 1-18 juvenile coho salmon exist for 1974. Four records of 1-34 juvenile and adult sockeye salmon exist. The limited existing information on this system is restricted to Murrell (1975). This system is a turbid meltwater system with probably little hydrological control on discharge by the associated lake basins. Lake basins are small and located in sub-basins. Several tributary streams are fed directly by Brady Glacier meltwaters.

Source: Merrell 1965

303
ADFG HAB # 114-77

RESULTS

Data on fish collections and observations are summarized in the following paragraphs.

Dolly Varden trout, Salvelinus malma (Walbaum)

Dolly Varden trout were observed in most of the creeks and ponds in the area near Casement Glacier (Fig. 1). They ranged in (estimated) fork lengths from 50 to 250 millimeters. The single specimen collected had a fork length of 74 millimeters and was caught by hand in a small stream within 35 meters of saltwater at the eastern end of Nunatak Cove on July 17, 1965 (Fig. 1, Site 1).

Chinook salmon, Oncorhynchus tshawytscha (Walbaum) ?

One specimen was collected with spinning tackle in a lake about one kilometer long on the island in Adams Inlet, on July 25, 1965 (Fig. 1, Site 2; also see Trautman, Fig. 13, this volume) and others of similar size were observed in the same lake. The fish was a female, 40 centimeters in fork length. Although positive specific identification was not made, the fish was tentatively identified in the field by Dr. Milton B. Trautman as a chinook salmon (O. tshawytscha). Only the head and eggs were preserved; these were later examined by biologists at the U. S. Bureau of Commerical Fisheries' Biological Laboratory at Auke Bay, Alaska, who confirmed its identity as a salmon from the number of brachiosticals (13). Scale circuli showed a growth pattern typical of freshwater; the fish had apparently never been to sea, as no ocean-type growth was evident. The scales had five annuli.

The fish was marked with dark spots on its back, dorsal fin, and both lobes of the caudal fin. The spots on the lower lobe of the caudal fin were smaller and less distinct than those on the upper lobe. The anal fin contained 15 rays, and the gum line around the bases of some of the teeth was black in color.

The ovaries contained 2,444 eggs in two stages of maturity: 1,119 eggs were approximately 0.5 millimeter in diameter; the remaining 1,325 eggs were larger, averaging 2.0 millimeters in diameter. These larger eggs were apparently approaching maturity, but were much smaller than those usually found in mature chinook salmon. Mature chinook salmon eggs normally range between 6.3 and 7.9 millimeters in diameter and fecundity ranges from 2,648 to 8,426 (Rounsefell, 1957, p. 465). The lengths of fish represented in Rounsefell's tabulation ranged from 64 to 103 centimeters, whereas the specimen collected at Adams Inlet measured only 40 centimeters. Rounsefell states that the size of the eggs depends upon the size of the parent salmon, the larger specimens producing the larger eggs. Thus, it is logical that small Adams Inlet landlocked salmon would contain small numbers and sizes of eggs. Abnormal maturation in freshwater may also have influenced fecundity.

NPS# 303
ADFG/HAG # [redacted]-77

Source: Cornelius ? [illegible] 1701
Cornelius

Euryhaline Fishes

8/20/69 Cont. During a walk up the stream, numerous trout were seen in the creek all the way up to the falls 3/4 of a mile up the stream. Fishing in the stream in the evening I caught one mature male dolly varden about 15 inches long. The fish was very red on its ventral side with white tipped ventral fins on their ventral side. It also had a hooked upper jaw.

8/23/69 Berg Bay - late PM - stream running into the south west corner of Berg Bay
- Pink salmon were running up the creek. There were quite a few within the first 1/4 mile of the creek, but only a few scattered fish beyond this. Few dead salmon were found. This seems to be the beginning of the run.

8/28/69 Nunatak River
- Observed 3 large (15"-18") trout-like fish in a pool several miles up the Nunatak River and 3 smaller (12" - 15") trout-like fish near the mouth of the river.
- One of the Nunatak miners said that he had caught 4 large dolly vardens in one of the ponds on the saddle between Goose Cove and Nunatak Cove.

8/29/69 Spokane Cove - Wolf Creek
- I observed a small number (3-4 dozen) dog salmon migrating up the lower reaches of Wolf Creek. I did not go above the chasm 1/4 mile up the creek to determine if they were able to pass it.

9/3/69 Gaikie Inlet - River running out of Wood Lake.
- A small number of pink salmon and dog salmon were in the River. The tide was in and it was interesting to see a group of about 12 pink and dog salmon along the shore in a small tidal arm of the sea. They were out of the river and over an intertidal region. They ranged from good to very poor condition.

Source: Cornelius 1969 Hatchery Creek

Euryhaline Fishes

6/27/69 cont. An interesting question is just how these fish could have gotten to ponds so recently freed from the ice. Ole suggests that one possible way would be for their parents to have been dropped by aquatic birds which is certainly possible. Another explanation could be that it is obvious by the high water mark of the stream beds that the ponds are connected to the salt water during wet periods but the descent from the 1st pond to the sea would be a raging torrent at such times. I have seen pictures of salmon going through water which was certainly as bad, but dolly vardens are much smaller. Further, why would the fish whose ancestors certainly didn't originate here, suddenly migrate up through a torrential stream to spawn. Perhaps this happens frequently and only a few selected streams with favorable topography are colonized. Throughout this discourse I am assuming that the dolly vardens are spawning in these ponds. I do not know this for sure, but the presence of the school of smaller fish and the observation by Ole of the apparent nesting sight of fish (depressions recently scooped out of the gravel) suggest that they are.
What ever the case, it is a real treat to be the first person to fish a pond and discover new fishing areas. It is also amazing that colonization by fish occurs so rapidly following the retreat of glaciers.

6/29/69 - Spokane Cove, immediately below where Wolf Creek flows into the main river which enters Spokane Cove
Hooked and lost an estimated 12 inch trout (probably a dolly varden)

7/12/69 Nunatak River - 200 yards above the mouth of the river.
- Hooked and lost a 15 to 16 inch trout (probably dolly varden).
- Worked my way upstream fishing and had no other strikes.

7/24/69 Upper Forest Creek along margin of Casement moraine.
- In a stream flowing southward along the old moraine edge into a pond

UP BAY RANGER
Unknown 1975

NPS = 303
ADFG/HAB # 114-77

Fish.

1975

8-21 Salmon Run 1st Creek North-west side of Entrance Geikie Inlet. 3-400 fish 1st ¼ mile - Humpback Salmon

8-26 Salmon Run in Nunatak Creek. 31 fish total count - Red Salmon for shore (16) + possibly 15 Humpback (fair, definate) found one fish on beach it was a humpback.

8-31 Salmon Run N Fingers Bay South Creek - 100-200 fish 1st ¼ mile. Mixed Humpback + Dog Salmon, 90% Humpback. Examined one of each type - female, both had spawned Also Much small fish 6-10" long (Dolly Varden?) in pools 200 yds upstream.

9-4 Salmon run Bearstrack River (small stream to N of Main River. Dog salmon ~500, two Humpback (Maybe) seen in River. Many ~100 fish on shore ½ eaten by Bear probably.

NPS # 303
ADFG # 11477
SF *

Dolly Varden fry were trapped for several miles further on up the stream. At Berg Bay the humpback salmon appeared to spawn at a time three to four weeks after the sockeye and at Vivid Lake concurrently. The apparent absence of humpback salmon at Nuntak Creek at a stage when the sockeye were already beginning to spawn would seem to indicate that the presence of humpbacks can only be in very small numbers - if at all. It must be remembered that the fry of humpback and chum salmon do not feed in the stream of their origin and possibly the planktonic food supply in the estuary area is too poor to allow adequate survival rates of the juveniles. In the area of Nunatak Creek are several lakes that have in the past been connected to streams flowing down from the highland areas which have now become completely isolated. Whether this will be permanent or is only a result of the past two dry summers is impossible to say, but in at least one of these lakes populations of land-locked salmonids now exist. The fish observed were approximately 20 cms in length and apparently smolted, i.e. turned silver, and lost the parr marks.

* Sticklebacks were commonly found in the stream and all small lakes and kettle ponds in the area.

Nunatak Creek. Visited during August for two weeks. Althoug only a very young stream the creek act as a spawning ground for a considerabl number of sockeye salmon, Dolly Varden coho salmon and possibly a few humpbac and chum salmon. The main area in which fish are found is the slow-flowi sidestream and associated terminal lak at the western perimeter of the gravel plain. In this side stream and lake 85 adult sockeye salmon were counted as well large numbers of fry of coh * sockeye and Dolly Varden.

In the mainstream itself just below the junction with the side stream were huge numbers of Dolly Varden in the very fast mainstream ranging in size from 20 to 40 cms (data from rod-caught specimens). Apart from this huge shoal of fish no other adult salmonids were observed although coho salmon and

Report of a hydrobiological expedition to GUBA, AK.
Milner. ~~1977~~ 1978.

NPS # [redacted]
ADFG # 114-77

Ecology of Post-glacial streams in GLBA, [redacted]. AK. Ph.D. Thesis. Chelsea College, Univ. of London 1983C Milner.

Stream No.	Adult	Juvenile
Wolf Creek (1)	None seen	None collected
Burroughs River (2)	None seen	None collected
Nunatak Creek (3)	August 1977-85 Oncorhyncus nerka were observed in a slow-flowing sidestream from an associated terminal lake. August 1978 + 1979 no O. nerka were seen but 12 were recorded in August 1980. November 1978 - 8 O. kisutch were seen. Numerous Salvelinus malma were observed each year 1977 to 1980.	August 1977, and 1979 Oncorhynchus nerka, O. kisutch and Salvelinus malma were recorded.
Vivid Lake and its outflow stream (4)	August 1977, 2000 + O. gorbuscha and 50 + O. keta were counted in the outflow stream together with numerous S. malma. In the lake 300 O. nerka were recorded.	August 1977, O. kisutch, O. nerka and S. malma were collected.
Berg Bay south stream (5)	From visits in August and September 1977, 200, O. gorbuscha, and a small number of O. keta and S. malma were observed. August 1978 500 O. gorbuscha, and small number of S. malma seen.	July 1977 - O. kisutch and S. malma collected in small numbers; principally in pools away from the stream edge.
Berg Bay north stream and its associated lakes (6)	July 1977 - 5000 + O. gorbuscha were seen in the stream below the first lake along with numerous S. malma. September 1977 - 300 O. nerka were recorded around the second lake shore and its inflow stream. August 1978, 2000 O. gorbuscha below first lake. July 1977, July and August 1979 Gasterosteus aculeatus and Cottus aleuticus collected.	July 1977 - July and August 1979: Numerous O.kisutch were collected in pools and slower margins of the stream. O. nerka and S. malma were collected in small numbers
Dundas Bay North Arm (7)	September 1977, 86 O. gorbuscha, 2 O. keta and 1 O. nerka were seen. July 1977 - numerous S. malma were seen and Cottus aleuticus collected.	July 1977 - O. kisutch, and S. malma were collected in small numbers
Dundas Bay West Arm (8)	No salmonids were seen. Gottus aleuticus was collected	July 1977 - O. kisutch and S. malma were taken in small numbers

TABLE NO. 3 V Adult and juvenile salmonids observed and collected in the eight study streams.

of Sperchon have been reported to live in the larval cases of Orthocladiini chironomids (Elgmork and Saether 1970).

Representatives of the Gastropoda and Bivalvia (Mollusca) were only collected in Berg Bay north stream.

In the kettle ponds and lake studied chironomids again dominated the fauna but with a shift in emphasis to the Chironominae. No plecopterans were found but two ephemeropterans, Callibaetis coloradensis and Caenis sp. and two trichopterans, Psychoglypha subborealis and Mystacides alafimbriata were collected. They are frequently encountered in lentic waters in south-east Alaska. Unlike the streams dytiscid coleopterans and amphipod crustaceans were collected. Three species of water mite were found, two in the typically lentic genus Arrenurus.

Five species of salmonid fishes were found in the streams of Glacier Bay. Oncorhynchus nerka (sockeye) was restricted to Nunatak Creek, Vivid Lake stream and Berg Bay north stream, all with lakes along their course. Of the streams studied, Berg Bay north stream was the best supporter of both adult and juvenile salmonids, particularly O. nerka, Oncorhynchus gorbuscha (pink) and Oncorhynchus kisutch (coho). It had relatively uniform discharges and a close border of stable bank vegetation. Numbers of salmonids were markedly lower in Berg Bay south stream, a system of similar size and age to the north stream but without lakes and subject to substantial fluctuations in flow.

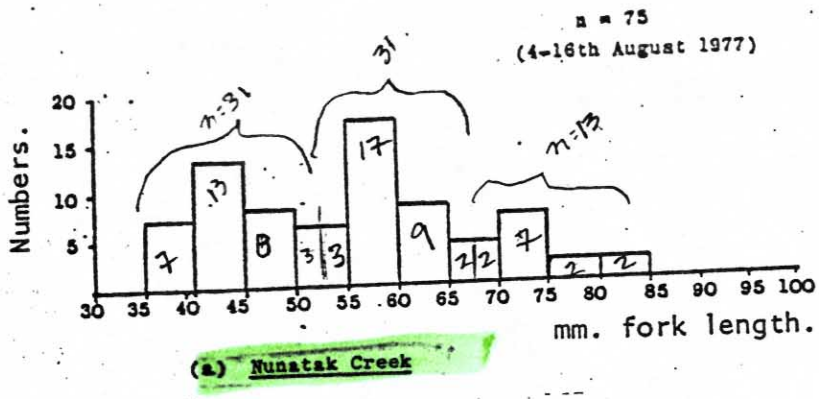
Milner. 1983c

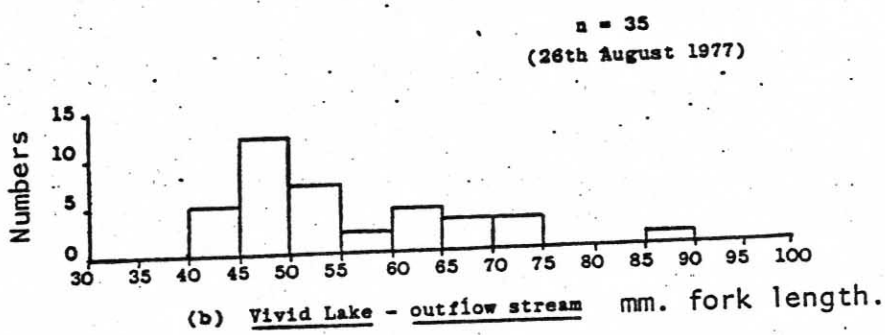
Nunatak Creek, a recently formed [illegible]
was utilized by fish for both spawning and rearing although numbers were low and O. gorbusha was not observed. In both Nunatak Creek and Vivid Lake outflow stream larger numbers of resident juvenile Salvelinus malma (dolly varden) were found than in the more established streams of Berg Bay. Resident juvenile O. kisutch were found in all the clearwater streams examined. However visits were unable to be made late enough in the year to observe spawning adult O. kisutch apart from one record from Nunatak Creek in November 1978. The study streams in Dundas Bay supported only small runs of fish and limited numbers of resident juveniles.

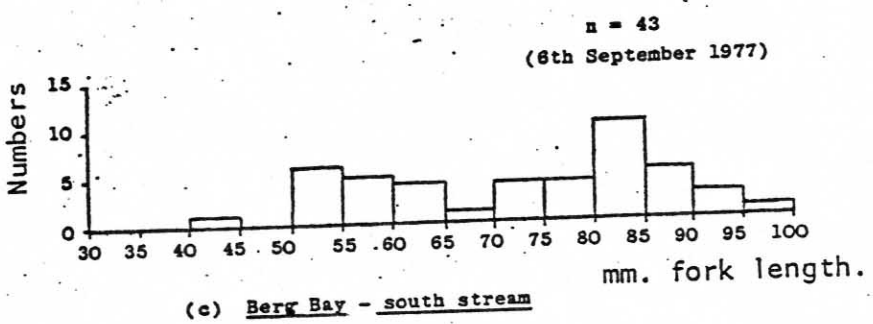
Condition factors (K) for first year resident fishes (O+) and older (1+) O. kisutch are very similar for each of the streams studied. Values of the regression coefficient (b) varied between 2.5 and 3.17 for first year fishes (O+) and older (1+) O. kisutch and were more variable than the condition factor (K). In Nunatak Creek and Vivid Lake outflow stream values of b were higher in relation to older fishes. The regression coefficient for juvenile S. malma exceeded 3 in both Nunatak Creek and Vivid Lake outflow stream. Correlation coefficients (r^2) (see section 5.4) which indicate the strength of the relationship between length and weight were higher for juvenile S. malma in comparison to O. kisutch.

Milner. 1983c

Milner 83c







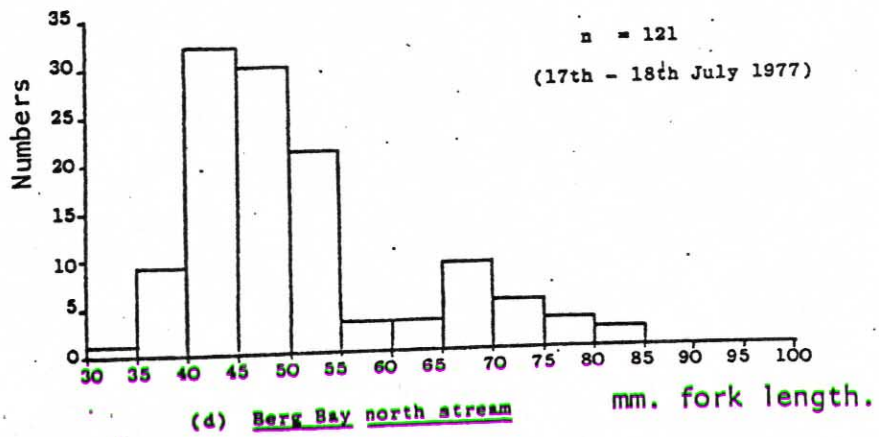


Figure 3(d) Length frequency histograms of juvenile Oncorhynchus kisutch from four streams. Time of sampling in brackets. n = number of fish sampled.

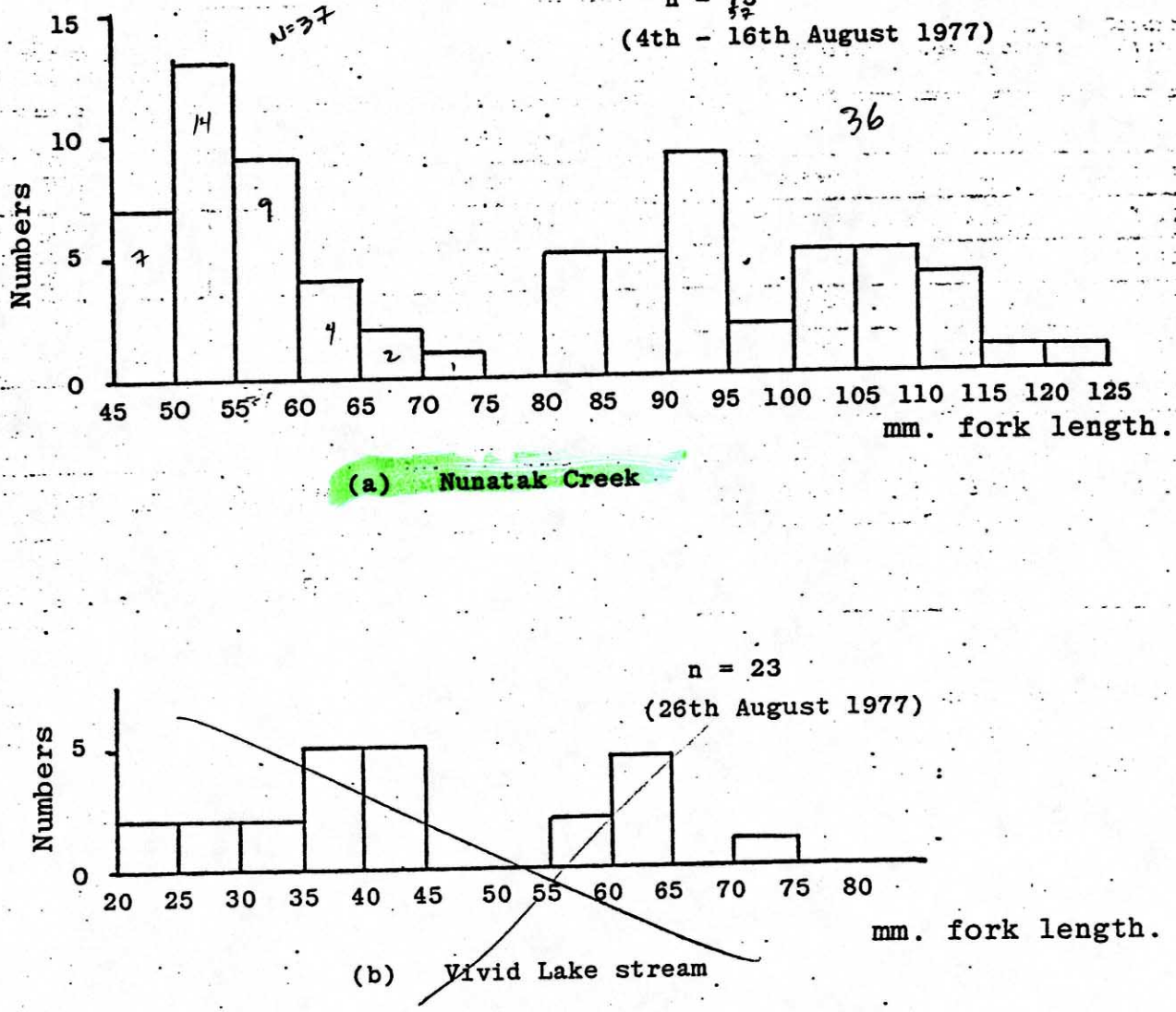


Figure 3 (iii) Length frequency histograms of juvenile Salvelinus malma from Nunatak Creek and Vivid Lake stream. Time of sampling in brackets. n = number of fish sampled.

Milner '83c

Stream (+ time of sampling)	Fish		No. of fish sampled	Correlation Coefficient (r^2)	Regression Coefficient (b)	Condition Factor (K)
Nunatak Creek (4-16 August 1977)	Oncorhynchus kisutch	< 55mm (0+)	38	0.895	3.191	1.21
		> 55mm (1+)	37	0.690	2.58	1.31
Vivid Lake outflow stream (August 26 1977)	Oncorhynchus kisutch	< 55mm (0+)	23	0.727	3.169	1.17
		> 55mm (1+)	12	0.962	2.904	1.12
Berg Bay south stream (September 6 1977)	Oncorhynchus kisutch	< 65mm (0+)	15	0.949	2.84	1.19
		> 65mm (1+)	25	0.781	2.91	1.19
Berg Bay north stream (17-18 July 1977)	Oncorhynchus kisutch	< 55mm (0+)	93	0.799	2.497	1.27
		> 55mm (1+)	28	0.974	3.07	1.27
Nunatak Creek (4-16 August 1977)	Salvelinus malma		73	0.992	3.029	1.18
Vivid Lake outflow stream (August 26 1977)	Salvelinus malma		23	0.976	3.407	0.932

TABLE NO. 3 VI Regression statistics (correlation coefficient r^2 and regression coefficient b) and condition factors (K) for two size classes of juvenile Oncorhynchus kisutch (< 55 mm and > 55 mm) from Nunatak Creek, Vivid Lake outflow stream, Berg Bay north and south streams and juvenile Salvelinus malma from Nunatak Creek and Vivid Lake outflow stream.

NPS # 303
ADFG # 114-77

Colonization and ecological development of new streams in GLBA
Milner. 1987!

Nunatak Creek

Pg.62"Small numbers of adult and juvenile coho (Oncorhynchus kisutch), sockeye (O. nerka) and Dolly Varden (Salvelinuis malma) were observed to spawn and rear in Nunatak Creek. Densities of juvenile Dolly Varden were significantly higher than coho. Sockeye spawners were only recorded in 1977 and 1980. No chum (O. keta) or pink (O. gorbuscha) salmon were observed.

Colonization & ecological development of new streams in GLBA. Milner. 1987

TABLE 2. Summary of biological observations in the general survey of six streams (July to September 1977)

	Wolf Creek	Burroughs River	Nunatak Creek	Vivid Lake Stream	Berg Bay South Stream	Berg Bay North Stream
Stream number	1	2	3	4	5	6
Plant life on substrate	Mats of filamentous algae	Mats of filamentous algae	Negligible	Small amounts filamentous algae	Negligible	Mats of filamentous algae and moss
Predominant proximal terrestrial vegetation	Dispersed mats of *Dryas drummondii* (Richards) and *Epilobium latifolium* (Sweet)	Few mats of *Dryas drummondii* and *Epilobium latifolium*	*Dryas drummondii* and *Epilobium latifolium*, *Salix* sp., *Alnus crispa* (Pursh)	*Salix* sp.	*Salix* sp., *Alnus crispa* Cottonwoods	*Picea sitchensis* (Carr) and *Alnus crispa* in close proximity
No. of invertebrate species						
Ephemeroptera	0	0	4	3	7	10
Plecoptera	0	0	2	1	4	3
Trichoptera	0	0	2	2	8	7
Chironmidae	5	3	14	9	18	16
Other Diptera	0	0	3	1	4	2
Hydracarina	0	0	0	0	2	4
Mollusca	0	0	0	0	0	4
Adult Salmonids (No. of spawners observed)						
O. nerka (sockeye)	—	—	15–20	300+	—	600+
O. gorbuscha (pink)	—	—	—	2000+	400+	7000+
O. keta (chum)	—	—	—	50+	20+	50+
S. malma (Dolly Varden)	—	—	200+	100+	100+	numerous
Juvenile Salmonids (relative abundance: +, rare; ++, occasional; +++, common)						
O. kisutch (coho)	—	—	+	++	+	+++
S. malma (Dolly Varden)	—	—	++	+	+	+

depth, substrate size and charac... divided into various qualifiers ... representation (I.R.) for each ... lated for each grouping as sugg... drew & Townsend (1976). The t... sents largest I.R. values (negat... tive) for those factors with the ... ence on the distribution of the ... analysis. The analysis indicate... most likely to be significant, ... unable to differentiate the relati... of factors which may be associat...

Results

The general survey

A summary of the ph... measurements and biological o... the six streams is given in Table... dendrogram from the cluster ...

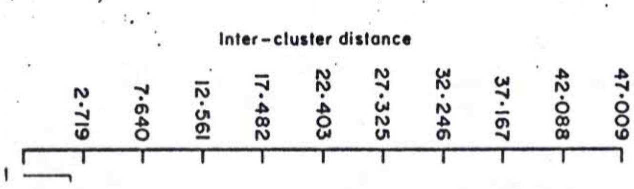


FIG. 2. Hierarchical cluster anal...

strong runs are known to occur in odd years, which would explain the numbers of pinks recorded in Berg Bay north stream. Berg Bay south stream showed a steady increase in pink numbers over the 8 years of the survey. Of the two other anadromous salmonids recorded, only the Dolly Varden charr, *Salvelinus malma* (Walbaum), was common in clearwater streams. Schools of adults were observed in Nunatak Creek and the Berg Bay streams during every visit.

Juvenile salmonids were separable into distinct age classes by length-frequency analysis (Fig. 2). Coho in 1977 exhibited notable differences in the modal length of the age classes between sites and months of collection. Berg Bay 1985 samples were dominated by age 0+ juveniles.

Values of the condition factor K for juvenile coho were 1·21 in Nunatak Creek, between 1·17 and 1·19 in Berg Bay south and between 1·23 and 1·27 in Berg Bay north. For Dolly Varden charr in Nunatak Creek, K was 1·18. Insufficient catches or recaptures precluded

Table 2. Counts or estimates of adult salmonids (*Oncorhynchus* spp., *Salvelinus* sp.) between 1977 and 1985 (C = common; OC = occasional; (J) = fry or juveniles caught)

Stream and survey months	*O. nerka* (sockeye)	*O. gorbuscha* (pink)	*O. keta* (chum)	*O. kisutch* (coho)	*S. malma* (Dolly Varden)
(1) Wolf Creek					
July–August 1977, August 1978, August 1979, September 1980, September 1981, August 1983, September 1985	0	0	0	0	0
(2) Burroughs River					
August 1977, August 1978, August 1979	0	0	0	0	0
(3) Nunatak Creek					
August 1977	85 (J)	0	0	0 (J)	OC (J)
August 1978	0	0	0	8	OC
August 1979	0	0	0	0 (J)	OC (J)
September 1980	12	0	0	0	OC
August 1981, August 1983	0	0	0	0	OC
September 1985	0	828	129	3	OC (J)
(4) Berg Bay South Stream					
July–September 1977	0	200	12	0 (J)	OC (J)
August 1978	0	500	5	0	OC
August 1979	0	930	0	0 (J)	OC (J)
September 1983	0	2700	0	0 (J)	OC (J)
September 1985	0	3708	20	0 (J)	OC (J)
(5) Berg Bay North Stream					
July–September 1977	300 (J)	5000	4	0 (J)	C (J)
August 1978	450	2000	0	0	C
August 1979	280	4320	0	0 (J)	C
September 1985	64	7281	0	80 (J)	C

(Other fish recorded: *Salmo clarki*, cutthroat trout — a small number in Berg Bay North stream; *Gasterosteus aculeatus*, Linnaeus 3-spined stickleback in Nunatak Creek and Berg Bay streams; *Cottus aceuticus* Gilbert, coastrange sculpin, in Berg Bay North stream.)

Milner & Bailey 1989

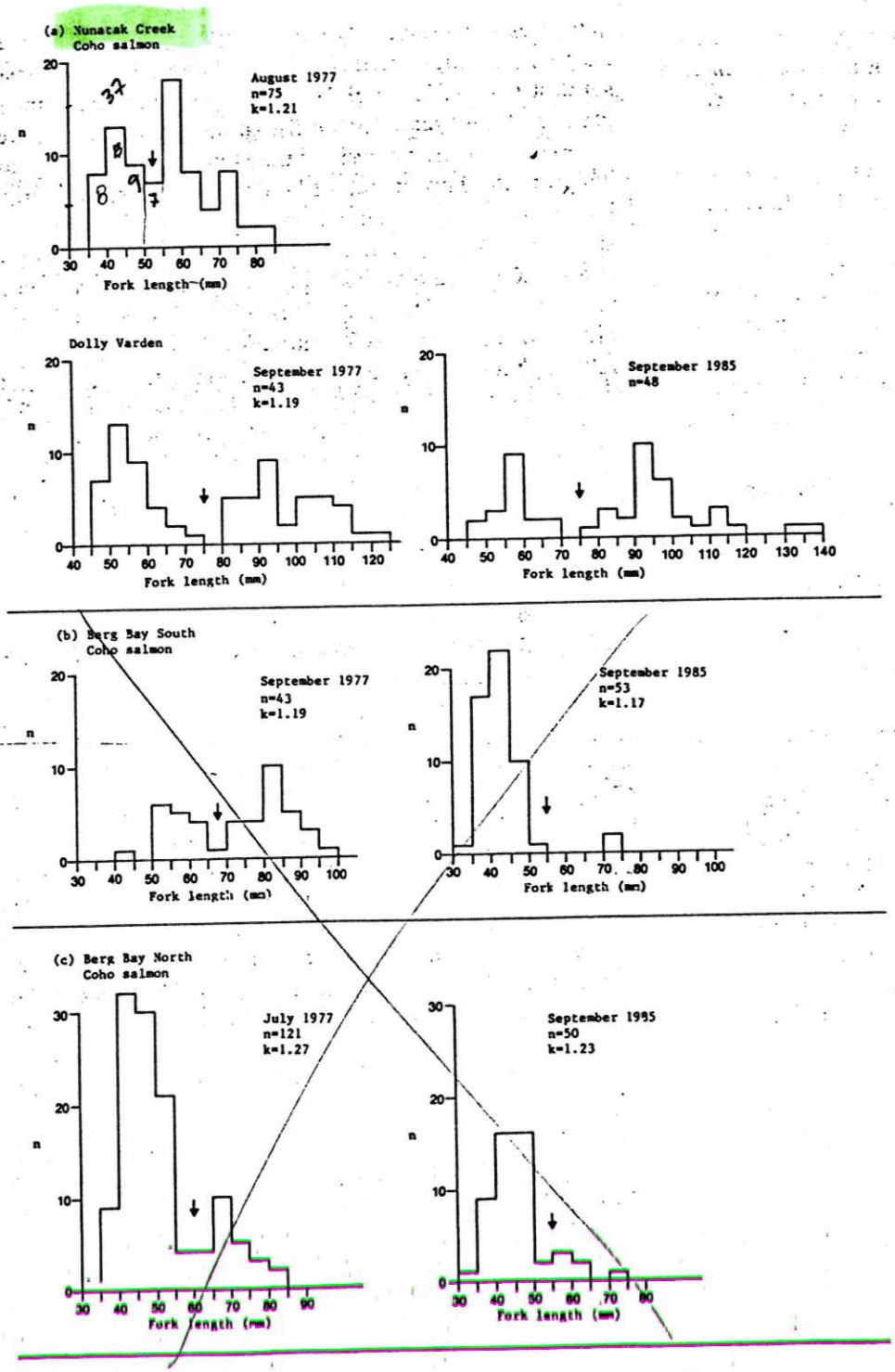
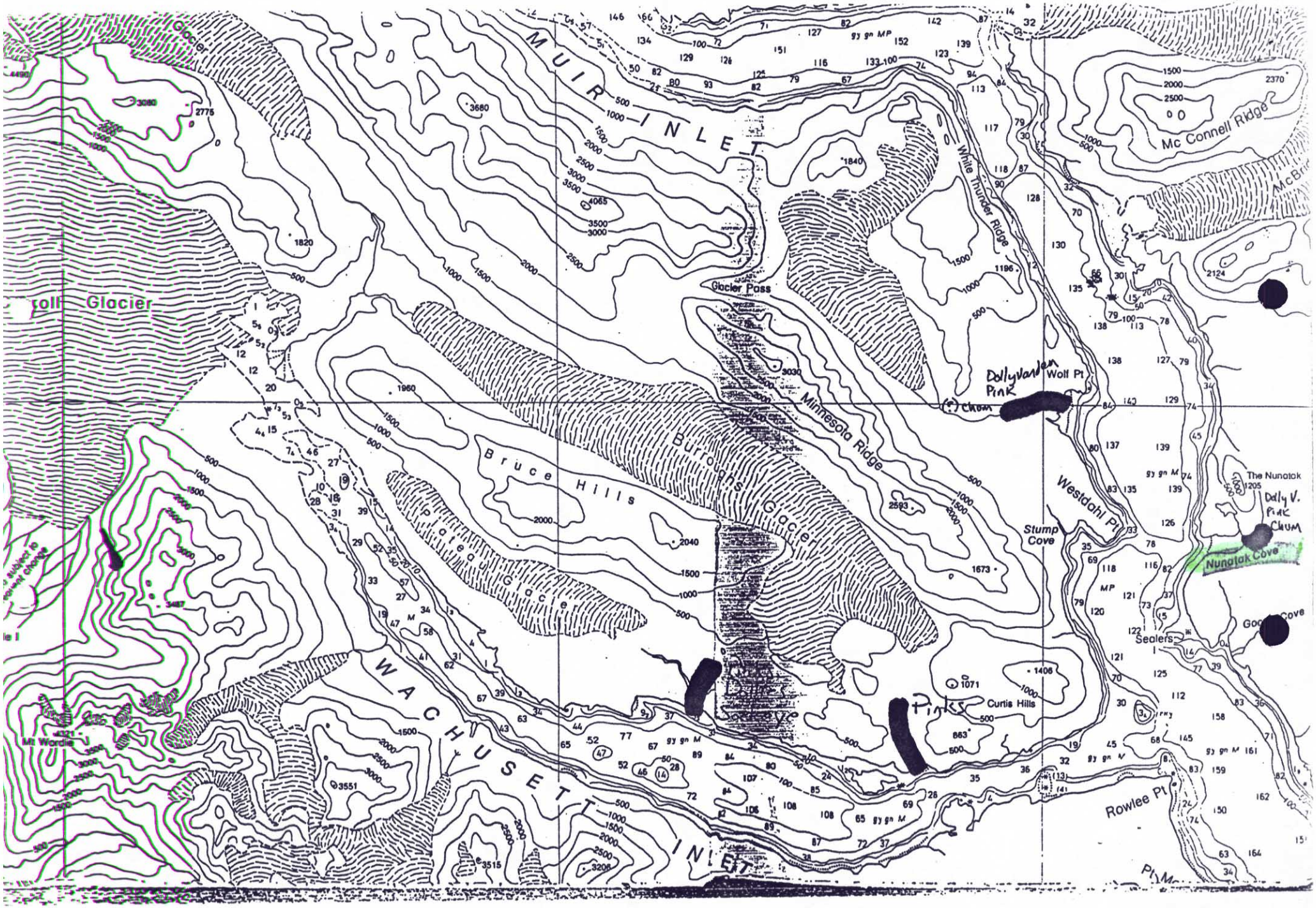


Figure 2. Length frequencies for coho salmon and Dolly Varden in the Glacier Bay streams.


MUIR INLET
Glacier Pass
Bruce Hills
Burroughs Glacier
Plateau Glacier
WACHUSETT INLET
Minnesota Ridge
White Thunder Ridge
Mc Connell Ridge
Wolf Pt
Dolly Varden Pink
Chum
Stump Cove
Westdahl Pt
The Nunatak
Nunatak Cove
Sealers
Curtis Hills
Pinks
Rowlee Pt
Mt Wordie
Glacier
Glacier

breeding pairs further upstream. Pink salmon were observed spawning in the riffles of the lower stream. The lake had no surface outflow, therefore the connection stream was dry and fish were denied access to the lake. An average of 45 sockeye were in the north stream past the connection. Pink salmon and dolly varden were also present in this section. A barrier waterfall approximately 0.8 km upstream prohibited further migration. Juvenile dolly varden and adult three-spined sticklebacks (*Gasterosteus aculeatus* L.) were caught in the minnow traps. Aerial flights confirmed the lack of water in the northwestern outflow connection. No fish were observed in the lake on either flight.

On 18 Oct the lake level had risen and the lake was well connected to the northwest stream. Coho salmon were present in this connection and the lake. Two pairs of salmon were observed spawning near the lake shore.

Wolf Point Creek

Wolf Point Creek was surveyed occasionally to assess salmonid colonization.

Foot survey: 29-30 Jul

no adult salmon

Foot survey: 24 Sep

Pink Salmon		**Chum Salmon**	
Live	0	Live	1
Dead	3		
total	3		

Willow and alder were beginning to become established along the stream banks, stabilizing the stream channel. Minnow trapping collected 1+ dolly varden, but no juvenile coho.

Nunatak Creek

Nunatak Creek was surveyed twice to assess salmonid colonization.

Foot survey: 30 Jul

no adult salmon

Foot survey: 23 Sep

Pink Salmon	
Live	0
Dead	7
total	7

Chum Salmon	
Live	0
Dead	6
total	6

Adult dolly varden were observed during the 30 Jul survey. Juvenile dolly varden were present on both surveys.

Bartlett River

The Bartlett River system historically supported a large salmon run (Taylor 1985). The spawning lakes for sockeye are relatively inaccessible, thus foot surveys were infrequent. Two foot surveys and 5 overflights were made (3 NPS and 2 ADF&G).

Foot survey: 3 Aug

Pink Salmon	
Live	5200
Dead	0
total	5200

Sockeye Salmon	
Live	0
Dead	0
total	0

Chum Salmon	
Live	0
Dead	0
total	0

Foot survey: 27 Sep

Pink Salmon	
Live	4
Dead	1000+
total	1004+

Sockeye Salmon	
Live	1606
Dead	172
total	1778

Chum Salmon	
Live	2
Dead	0
total	2

The lower 2.5 km of the Bartlett River was surveyed on 3 Aug. Large schools of pink salmon were observed in holding habitat along the stream margins beginning about 1.5 km from the mouth. Suitable spawning habitat approximately 2.5 km from the mouth, but was difficult to access by foot or raft.

On the 26 Sep survey, originating at the lakes near the headwaters, most sockeye salmon were observed shore spawning in the east lake. Remaining fish were schooled in the adjoining lake. No sockeye salmon were observed in the river proper during the float to the mouth.

critical times. The quality of the lake spawning is also questionable because of vegetative encroachment and the build-up of organic debris covering gravels. With the lake generally at lower levels, the higher water level that enables adults to enter may leave them no place to spawn. Further systematic surveys of the Vivid Lake system are needed to better understand and monitor this complex, but perhaps ephemeral, system.

Wolf Point Creek

The first recorded observation of adult salmon in this stream occurred. The odd-year run of pink salmon may have forced adults to colonize further up-bay in search of open habitats. The even-year run of 1990 may not support such colonization. The stream should be monitored carefully for its development as a salmon stream. Although there is a lake in the system, it is unlikely that the lake could be accessed by sockeye because of the barrier waterfall just below it.

Nunatak Creek

The presence of chum and pink salmon in this system indicate further developments as a spawning stream. Foot surveys taken in 1977 through 1981, and in 1983 and 1985, reported adult sockeye present in small numbers in 1977 and 1980 (Milner 1987, 1989). Adult coho were present in small numbers in 1978 and 1985. Milner (1989) reported 828 pink and 129 chum salmon in 1985. Nunatak Creek is a very good stream to track the salmon colonization process.

Bartlett River

The Bartlett is a productive system but it does not rival figures of 75,000 to 100,000 sockeye salmon that used this system around the 1900's. The elimination of the Bartlett Lake from the system due to isostatic rebound is responsible, in part, for the smaller runs in recent history (Perry 1987). Overfishing has also contributed to the decline to some degree (Perry 1987).

The Bartlett River system was difficult to survey either by plane or by foot. No lake spawning in the upper lakes was observed from the air, only schooled fish were counted. An ADF&G overflight reported 1500 chum (noted as a rough estimate) yet only 2 were observed during both foot surveys. A common problem in aerial surveys is misidentification of chum and pink salmon (Delaney 1977). This could be the case in Bartlett River along with timing or the higher flows and turbid water encountered in the second survey. A clearer understanding of this system requires at least some ground-truthing to substantiate aerial surveys.

NPS # 303
ADPG-TAB # 114-77

1991

Hilner 1994

Escapement Counts

D = dead
L = live

Wolf Pt Creek.		Pink	Chum	Coho	Sockeye.
8	16 91	350 (L) 5 (D)			
8	30 91	486 (L) 89 (D)			

Nenatak

8	17 91	456 (L) 45 (D)			
8	30 91	302 (L) 45 (D)			

Sull Creek

14	94	394 (L) 1 (D)			5 (L)

date
Correct %

1992

Milner 1994

* Even year for Pink.

D = dead
L = live

Wolf Point Creek.	Pink	Chum	Coho	Sockeye.
8/8/92	—	—	—	—
8/14/92 (Difficult to see-heavy rain)	—	—	—	—
8/27/92		2 (L)		
9/6/92		25		

Tenalake

8/10/92	2			
8/26/92	12 (L) 1 (D)			
9/14/92	50 (L) 25 (D)	100 - 150 (L)		

all Lake.

6/92				6
11/92				62
26/92	- 5 (L)			80 (live) mostly in-lake
7/92	4 (L) 4 (D)		7 (L)	125 (D) 23 (L)
15/92				> 248 (D)
10/92				
29/92	250	20		400

D=dead
L=Live

NPS # 303
ADFG/HAB # 114-

1993 * [redacted] is the best data

Milner 1994

Joy Point Creek

	Pink	Chum	Coho	Sockeye
8/1/93	932 (L)			
8/6/93	1324 (L)			2
8/13/93	1793 (L) 32 (D)			3
8/28/93	1688 (L) 1106 (D)	6		10
9/2/93	853 (L) 2260 (D)	9		17 (L) 2 (D)
9/12/93	181 (L) 2452 (D)	6 (L) 2 (D)		9 (L) 4 (D)

[redacted]

1/31/93	2038 (L)			
3/6/93	1925			9
3/14/93	1888 (L) 162 (D)			
3/19/93	1736	3		19
3/29/94	956 (L) 1540 (D)	31		few still in lake
4/3/94	405 (L) 1876 (D)	8 (L) 8 (D)		2 (D)

Small [redacted]

5/16/93	(V. low water)	15 (L) 22 (D)		50 (L) 32 (D)
5/21/93	" "	18 (L) 151 (D)		18 (L) 20 (D) (+50 in lake)
5/29/93	517 (L)	795 (D)		175 (L) 115 (D)
6/3/93	213 (L)	748 (D)		

NPS # 303
ADFG # 144-77

1993 Season

April 15, 1994

MEMORANDUM FOR: Dr. James Olsen, Program Manager
U.S./Canada Salmon Treaty Studies

FROM: Christine Kondzela, Fishery Research Biologist
U.S./Canada, Genetic Stock Identification

SUBJECT: Cruise JC 93-10 Leg II, NOAA Ship JOHN N. COBB
Results of field sampling in Glacier Bay for stream colonization study.

From August 29-September 9, 1993, Sharon Hawkins, Charley Russell, Chuck Guthrie, and I collected sockeye, pink, and chum salmon tissue samples from streams in and near Glacier Bay. This sampling effort was supported by the R/V JOHN N. COBB and its crew. Below is a summary of our collecting effort.

DATE	LOCATION	SPECIES	NO. SAMPLES	No Live
8/29	St. John Baptist Bay #113-66-60	Pink	100	
8/30	Wolf Creek, Glacier Bay	Pink	101	
8/31	Nunatak Creek	Pink	95	1500
9/1	Gull Creek	Sockeye	32	
9/1,2		Pink	103	
9/3,4	Vivid (stream north of lake) #114-75-??	Sockeye	101	
		Chum	100	
9/5	Tyndall Cove #114-73-15	Pink	100	
9/6	N. Berg Bay, outlet stream #114-71-32	Pink	100	
9/7	Homeshore Creek #114-25-10	Pink	103	
9/8	east of Kahtaheena Cr. #114-23-24	Pink	101	

The remainder of this report provides more detailed information on the collecting effort and information about particular areas.

August 29 On our way from Sitka, where we met the vessel, to Glacier Bay, we stopped in St. John Baptist Bay and sampled mostly unspawned pink salmon just above the intertidal region from a small stream at the head of the bay to fill in a hole in our baseline. Stream bed was small gravel, water fairly dark with tannic acid, temp = 13 C. Saw two chum carcasses and one bright coho.

August 30 Sampled Wolf Creek on the west side of Muir Inlet for pink salmon. This stream has changed drastically from previous years: until this year, the stream had a high flow of very turbid water and fish were very difficult to see and sample. This year, the stream was nearly clear (there was more good spawning habitat that I had previously assumed); the flow was very low (as was true for all streams this warm, dry summer), the temperature was 13.5 C (in the summer of 1977 the temp = 2 C), and fish were very easy to see and more numerous than ever reported. We did not have time to investigate the lake above the falls, but I would guess that the reduction in turbidity was caused by the complete disappearance of glacial ice in the system and lack of rain. We estimated that there were over 2,000 pink salmon and hundreds of carcasses from saltwater up the entire one-mile length of stream to the barrier falls; we also counted 10 dark chum in the lower half of the stream and 9 bright red sockeye in the upper half. Visited with two of Dr. Milner's graduate students, Liz Adamson and Colin ??, who have spent the summer in Glacier Bay to study stream ecology. They had recently counted over 500 live and 800 dead pink salmon in Gull Creek (about half way into Wachusett Inlet on the north side) and over 100 live sockeye in the small lake, near the outlet.

August 31 Sampled pink salmon from Nunatak Creek, across from Wolf Creek, on the east side of Muir Inlet. Live and dead pink salmon were abundant (1-2 thousand??) from the upper half of the huge tidal flat to the small lake about 1/2 mile upstream and into the inlet creek. Also saw 6 sockeye in the lake and inlet stream, and possibly about 20 chum in the lower stretch of the stream.

September 1 Collected tissue from 81 spawned-out pink salmon in the stream that drains Gull Lake. As usual, the bugs were hungry. Used a small seine net at the mouth on a low tide to sample a plug of muscle and clip the adipose fin from 15 unspawned sockeye that were blocked from moving upstream due to extremely low water flow. We counted 20-30 sockeye and about 100 pink salmon at the mouth trying to move upstream. Also sampled from 13 sockeye in a deeper stretch of water before the lake. Stream temp = 16 C.

September 2 Collected the remainder of the pink and sockeye salmon from Gull Creek. Sharon and I rowed the Achilles inflatable raft around the perimeter of the lake and found a concentration of 100-150 sockeye on the steep gravel side (flat shore above the water) at the west end of the lake. Several of these bright sockeye were very small (large herring size). Saw no way to sample these fish due to their location. Most of the lake margin is composed of very fine, compacted mud/silt. On the east end of the lake we found a dozen or so pink salmon that appeared to be spawning on a very steep, gravel slope. The inlet stream was just a trickle. Lake temp = 16 C.

September 3 Spent the day on the stream that drains just north of Vivid Lake in the NW arm of Glacier Bay sampling sockeye and chum salmon. Lots of animal sign - moose, wolf, bear, birds, and lots of fish! As a rough estimate, we saw 5000+ live pink and thousands of dead, 2000+ sockeye, 1500+ chum, and several large Dolly Varden. Saw

C. Kondzela
NMFS
Aug. 29 - Sept 8, 1994

NPS # 303
ADFG&G # 114-77

GLACIER BAY NATIONAL PARK

DATE	LOCATION	SPECIES	NO. SAMPLES
8/30	Wolf Cr. 114-	Pink	12
		Chum	3
	Numatak Cr. 114-	Pink	24
		Chum	4
8/31	Numatak Cr.	Pink	81
		Chum	20
9/1	Numatak Cr.	Chum	70
9/2	Gull Cr. 114-	Sockeye	147
9/3	Vivid Cr. 114-75-	Pink	100
9/4	Wolf Cr.	Pink	29
		Chum	8
9/5	Seclusion Lake, inlet 114-60-080-2004	Sockeye	96
9/6	Bartlett R. 114-70-090	Pink	58
9/7	Dundas Bay, N. Hd. 114-60-066	Pink	100
9/8	W. of Swanson Harbor 114-25-035	Pink	100

KENAI FJORDS NATIONAL PARK

9/12	Delusion Lake, inlet 232-23-	Sockeye	80
		Pink	90
9/13	Desire Lake 232-23-012-0010	Sockeye	100

In addition to these two systems, we were provided tissue samples from 100 sockeye collected 9/22/94 in the Delight Lake system (232-23-010-0010) by Homer ADF&G personnel: Trish McNeill, Tom Sigurdsson, and Greg Demers.

cc:Wilmot, Helle, Guthrie

GBFIELD.94

1994 Field Sampling in Glacier Bay

R/V John N. Cobb Cruise JC-94-12

August 29-Sept. 8, 1994

Scientific Personnel: C. Kondzela, S. Hawkins, R. Wilmot

Cobb Crew: Frank Wood, Matt Eagleton, Otis, Del, Strydr Nutting, Jim McCandless, Dan ??, Bill Lamoreax??

August 31, 1994 (Wednesday)

August 29, 1994 (Monday)

We departed Juneau about 8 AM; arrived at the mouth of Glacier Bay about 4 PM; continued up the bay after radioing our arrival to Bartlett Cove KWM-20. Anchored at Stump Cove about 9 PM (not sure of the time, but it was dark), just south of Wolf Creek. On our way up Muir Inlet, near our anchorage, we could see the lights of the Park Service's R/V Nunatak anchored at Wolf Creek. Dr. Alexander (Sandy) Milner and his student Liz Adamson are doing stream ecology work in the area.

August 30, 1994 (Tuesday)

Strydr ran us north in the COBB Whaler to Wolf Creek in the morning; Dan assisted in collecting samples and carrying gear. The whitesoxs were abundant, but rain kept their numbers down most of the day. The stream was almost as clear and at about the same level as last year. However unlike last year, we found few pink salmon, dead or alive. I did not make actual counts, but a fairly good estimate of numbers for the stream from saltwater to the barrier falls (could not see fish in the pool at base of falls) is as follows: pink salmon (100-200), sockeye (<20) which is similar to last year, and chum (<20), also similar to last year. Dolly Varden were plentiful, both adult and juvenile forms; in the process of catching salmon we dipnetted over 20 DV. Water was 14 C at 10:20 AM. We found very few fish or carcasses in the intertidal area.

We sampled 5 spawned pinks for all tissues[1], and a muscle plug and adipose fin from 7 unspawned pink salmon and 3 chum[2]. Because most of the few pink salmon in this stream have not spawned, I decided to sample it again in a few days. So the remainder of the day was spent in the lower section of Nunatak Cr., across Muir Inlet, where we sampled pink, and for the first time, chum salmon. From chum we collected tissues from 1 spawned and 3 unspawned fish; from pink we collected tissues from 24 spawnouts in the intertidal

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[1]My field notes list a carcass that we may have sampled as well.

[2]When fish were spawned, we killed them and took muscle, heart, liver and eye tissue, as well as scales for chum and scales and brain tissue for sockeye salmon. Unspawned fish were held in a dipnet in the water, a plug of muscle tissue was taken behind the dorsal fin with a cork borer, the adipose fin was clipped, and the fish released. Based on our observations on subsequent days, fish we sampled in this manner suffered no ill effects.

rea and just above the intertidal area. Although pink salmon were ot as plentiful as last year, they were in large enough numbers to sample 100 fish. Recorded MEFT lengths and gender of the spawned fish, cut off the back 3/4 of the fish and hauled a stringer of pink heads back to the COBB to process into 2 mL tubes. The chum samples were put into whirlpak bags in the field. 7:30 AM - 5:30 PM, 6-8 PM (12 hrs) [illegible] than last year, and this [illegible] or sockeye [illegible] access any part of the stream at this point in time. [illegible] stream mouth

August 31, 1994 (Wednesday)

Spent the entire day at Nunatak Cr.; Jim helped us onshore: We collected tissues from 81 more spawned pink salmon for a grand total of 105 fish. Fish #25-47 were taken intertidally (mostly upper region), #47-76 were taken about midway upstream, and #77-105 were collected midway to upper stream. The uppermost area just before the stream empties from the lake was not sampled, since we had over 100 fish by the time we walked that far. A rough estimate of number of pink salmon in the stream would be somewhere around 1500-2000 fish. We recorded the MEFT length and gender, removed the back 3/4 of the body, and hauled stringers of fish heads back to the COBB to process into 2 mL plastic tubes. We also collected tissues from 7 spawned and 13 unspawned chum in the lower parts of the stream; these samples were put into whirlpak bags in the field. No recent sign of bear as in past years, however the usual moose tracks, wolf, and bear tracks and/or scat were present in the area. Water temp was 10.8 C at 12:15 PM. The water level in this stream was slightly lower than in past years, so it was a little easier to see and catch fish. Because there were only three people from the genetics staff, our processing time was longer than average. 7:30 AM - 5:30 PM, 6-8:30 PM (12.5 hrs)

September 1, 1994 (Thursday)

Spent another day at Nunatak to sample chum salmon--the stream had more than I have ever seen before, although the total number (and this is a rough guesstimate) was only 500-1000 fish. The chum are much harder to count because they concentrate in deeper, faster, more turbid water. Our last set with a beach seine in the mid-upper section of the stream was the most successful. We caught over 20 fish, mostly chum; so many fish hit the net that Sharon and I almost ended up horizontal in the creek! We collected tissues from 42 spawned and 28 unspawned chum salmon for a grand total of 94 fish. Chum #25-54 were collected in the upper stream below the lake, #55-69 were collected above the lake at the mouth of the inlet stream (we had to sneak up on these fish and block the stream with the seine to sample them), #70-94 were collected mid-stream. We also took tissue from one dead and one unspawned sockeye in the lake. We found no sockeye in the inlet stream, but we could see a few in the lake and a connecting lake/pond on the south side of the drainage. They could be sampled with a boat and large seine, but all we had were dipnets, which were not useful in this situation. Snagging with rod/reel might work. We did not have time to walk around the lakes, so I do not have an estimate for numbers, but based on the small area we could see, there are not many sockeye, maybe a few hundred. 7:30 AM - 5:30 PM (10 hrs).

NPS * 303
DFGHAB* 114-77

Shroeder 1991

==========
Fingers North live pink 50 13 Sept C. Kondzela 1991
dead pink "few"
==========
Vivid Lake
7/4/91 MTS
poor conditions
==========
Vivid Lake
7/21/91 LC&TD
live fish 1170-1270
see below
==========
Vivid Lake
7/25/91 MTS
live\dead pinks 0
live chum 976
live sockeye (30)
hard to separate spp.
==========
Vivid Lake
8/5/91 TD&LC
Live chum ~520
live pink ~509
under-estimate (turbid)
==========
Vivid Lake
8/16/91 TD&LC
live chum/Sockeye 1200+
live pink 4100
==========
Vivid Lake
8/31/91 TD&LC
too turbid to count
==========
Vivid Lake
9/13/91 TD&LC
live Pink 239
dead pink 66
live chum 543
dead chum 49
live sockeye 413
dead sockeye 20
good conditions
==========
Nunatak Creek
9/3/91 CK et al. Chris Kondzela, Michele Masada, Pat Rounds
live pink ~1000
dead pink ~1400
live chum 55+
dead chum 20+
live sockeye 0
dead sockeye 2
==========

	live	dead	species
8/14	294	1	Pink
Gull			
8/16	350	5	Pink
Wolf			"
8/17	Nunatak 456	45	

8-17-91 Miller
456 live pink
45 dead pink